

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2005-0106

WAIVING WASTE DISCHARGE REQUIREMENTS
FOR
CITY OF ROSEVILLE
DIAMOND CREEK WELL
PHASE II DEMONSTRATION AQUIFER STORAGE AND RECOVERY PROJECT
PLACER COUNTY

WHEREAS, the California Regional Water Quality Control Board, Central Valley Region, (hereinafter Regional Board) finds that:

1. Water Code Section 13260(a) requires that any person discharging wastes or proposing to discharge wastes within the region that could affect the quality of waters of the State shall file a Report of Waste Discharge; and
2. The City of Roseville (City) submitted a complete Report of Waste Discharge, including a \$6,235 filing fee, for its Phase II demonstration aquifer storage and recovery (ASR) project on 16 May 2005; and
3. The ASR demonstration project will be used to evaluate opportunities to store treated water from the City of Roseville's Water Treatment Plant (WTP) in the groundwater basin underlying Placer County by direct injection during the "wet" years with subsequent extraction to supplement the City's surface water supply during "dry" years; and

Phase I Results

4. The City completed the Phase I ASR demonstration project under Resolution No. R5-2003-0083 in December 2004. The Phase I project consisted of 26 days of injection at approximately 1,350 gallons per minute (gpm), and approximately 29 days of extraction at approximately 3,400 gpm; and
5. The total volume of water injected during the Phase I ASR demonstration project was approximately 158 acre-feet, and the total amount extracted was 439 acre-feet or approximately 278 percent of what was injected; and
6. After completion of the City's Phase I ASR demonstration project, only three constituents remained in groundwater at concentrations slightly higher than baseline conditions. Those constituents included chloroform at 1.5 micrograms per liter ($\mu\text{g/L}$), dissolved fluoride at 0.2 milligrams per liter (mg/L), and dissolved organic carbon at 2.3 mg/L; and

Injection and Monitoring Wells

7. The Phase II ASR demonstration project will be conducted using the Diamond Creek Well (DCW) located in a park setting, adjacent to the Diamond Creek Elementary School near the

intersection of Northgate Drive and Big Bear Drive in Roseville, as shown on Attachment A which attached hereto and made part of this Resolution by reference; and

8. Treated water will enter the drinking water distribution system at the City's WTP and will be conveyed approximately 13.2 miles to the DCW, and

9. The DCW consists of a 20-inch diameter casing screened from 310 to 450 feet below ground surface (bgs), and monitoring of the injection/extraction activities at the DCW will be completed using three 4-inch diameter groundwater monitoring wells that are screened within the same water bearing zone as the DCW; and

10. The water bearing zone consists primarily of gravelly sand and sandy gravel of the Mehrten formation; and

11. The City has installed the three groundwater monitoring wells (DCMW-1, DCMW-2, and DCMW-3) to measure the effect of the injection and extraction on the underlying groundwater; and

12. The DCMW-1 is 117 feet southeast of the DCW, DCMW-2 is 196 feet northeast of the DCW, and DCMW-3 is 1,417 feet southwest of the DCW, as shown on Attachment B, which is attached hereto and made part of this Resolution by reference; and

Injected Water Quality

13. The source of the water injected into the aquifer will be treated surface water from Folsom Lake which is sent to the City's WTP for conventional treatment including coagulation/flocculation, upflow clarification, gravity filtration through dual media filters, chlorine disinfection, fluoridation, pH adjustment for chlorine control; and

14. The chemicals used in the treatment of the source water include: (a) aluminum sulfate, used for primary coagulation; (b) chlorine, used for primary disinfection, pre-chlorination, and periodic chlorination of filters; (c) lime, used for corrosion control through pH/alkalinity adjustments; and (d) hydrofluosilicic acid polymer, used as a coagulant and fluoride additive; and

15. The quality of the treated water injected into the aquifer will meet Department of Health Services (DHS) drinking water standards for all constituents; and

16. Baseline water samples were collected from the City's WTP and the DCW in May 2004, prior to the Phase I ASR demonstration program, and in May 2005. Analytical results are presented below with limits applying their applicable water quality objectives for protection of the beneficial uses of the underlying groundwater:

Constituent	Units	WTP Injection Water Sample	DCW Baseline Groundwater Sample	Ground Water Quality Limit
pH	std.	7.3 – 8.9	6.5 – 7.3	6.5 to 8.4
Dissolved Organic Carbon	mg/L	0.9 – 1.9	<0.1– 0.3	None
Total Kjeldahl Nitrogen	mg/L	<0.1	<0.1	None
Total Alkalinity	mg/L	24 – 34	59 –61	None
Total Dissolved Solids	mg/L	47 - 61	430 – 470	450
Chlorine Residual	mg/L	0.36 – 0.9	<0.05	0.002
Aluminum, dissolved	µg/L	21 - 32	<10	200
Ammonia, dissolved	µg/L	<10	<10	1,500
Antimony, dissolved	µg/L	<0.5	<0.5	6
Arsenic, dissolved	µg/L	<0.5	1.8 – 2.5	0.004
Barium, dissolved	µg/L	15	79 – 91	1,000
Beryllium, dissolved	µg/L	<1.0	<1.0	1.0
Boron, dissolved	µg/L	<100	700 – 730	700
Bromide, dissolved	µg/L	<10	330 – 1,800	2,300
Cadmium, dissolved	µg/L	<0.1	<0.1	0.07
Calcium, dissolved	µg/L	9,000 – 10,000	31,000 – 36,000	None
Chloride, dissolved	µg/L	3,800 - 4,000	150,000 – 170,000	106,000
Chromium, dissolved	µg/L	<5.0	5.8 – 8.2	50
Cobalt, dissolved	µg/L	<2.0	<2.0	50
Copper, dissolved	µg/L	<5	<5	170
Fluoride, dissolved	µg/L	300 – 1,100	<100 – 510	1,000
Iron, dissolved	µg/L	<5.0 - 120	<5.0 – 100	300
Lead, dissolved	µg/L	0.5 – 0.68	<0.25	2
Magnesium, dissolved	µg/L	2,000 - 2,200	15,000 – 18,000	None
Manganese, dissolved	µg/L	<5.0-30.0	<5.0	50
Mercury, dissolved	µg/L	<0.2	<0.2	1.2
Molybdenum, dissolved	µg/L	<5.0	<5.0	10
Nickel, dissolved	µg/L	1.6 – 2.0	4.0 – 4.7	12
Nitrate as N, dissolved	µg/L	<100 – 300	1,200 – 5,900	10,000
Nitrite as N, dissolved	µg/L	<30	<30	1,000
Phosphate, dissolved	µg/L	<100	<100	None
Potassium, dissolved	µg/L	500 – 600	2,100 – 3,100	None
Selenium, dissolved	µg/L	<2.0	<2.0	20
Silica, dissolved	µg/L	9,600 – 12,000	63,000 – 74,000	None
Silver, dissolved	µg/L	<3.0	<3.0	35
Sodium, dissolved	µg/L	4,000 - 4,300	71,000 – 85,000	20,000
Sulfate, dissolved	µg/L	6,000 – 13,000	25,000 – 27,000	250,000

Constituent	Units	WTP Injection Water Sample	DCW Baseline Groundwater Sample	Ground Water Quality Limit
Sulfite, dissolved	µg/L	<500	<500	None
Thallium, dissolved	µg/L	<0.1	<0.1	0.1
Tin, dissolved	µg/L	<1.0	<1.0	None
Vanadium, dissolved	µg/L	<2.0	18	50
Zinc, dissolved	µg/L	<20	<20	2,000
Total Coliform Organisms	MPN/100 mL	<2.0	<2.0	<2.2
Total THMs	µg/L	36.2 – 50.9	<1.0 – 16.4	80
Chloroform	µg/L	34– 43	0.5 – 5.4	1.1
Bromoform	µg/L	<0.5	<0.5	4
Bromodichloromethane	µg/L	2.2 – 3.1	<0.5	0.27
Dibromochloromethane	µg/L	<0.5	<0.5	0.37
Fluorobenzene	µg/L	9.9 – 10.5	8.2 – 11	None
Total HAAs	µg/L	20.9 – 23.7	<1.0	60
Dichloroacetic acid	µg/L	4.7 - 8.9	<1.0	0.7
Trichloroacetic acid	µg/L	12 – 17	<1.0	20
Dibromoacetic acid	µg/L	<1.0	<1.0	None
Bromoacetic acid	µg/L	<1.0	<1.0	None
Chloroacetic acid	µg/L	<1.0	<1.0	30
N-Nitrosodimethylamine (NDMA)	µg/L	<5.0	<5.0	0.0022
Volatile Organic Compounds ¹	µg/L	ND	ND	
Semi-Volatile Organics ¹	µg/L	ND	ND	
Organophosphorous Pesticides ¹	µg/L	ND	ND	

¹ Individual constituents of Volatile Organic Compounds, Semi-Volatile Organics, and Organophosphorous Pesticides were not detected above their respective detection limits. Water quality limits for these constituents are not shown.

17. These baseline data presented above indicate that fluoride, chlorine residual, chloroform, bromodichloromethane and dichloroacetic acid exceed water quality limits in samples collected from the WTP. In addition, the City's analytical quantitation limits for dibromochloromethane and NDMA's were higher than the their respective water quality limits; and

Injection, Storage and Recovery (ISR) Cycles

18. The Phase II ASR demonstration project will include: (a) one month of baseline data collection, (b) injecting a total of 1,094 acre-feet (3.56×10^8 gallons) of water at a rate of 1,375 gallons per minute (gpm) for six months, (c) storage of the injected water in the aquifer for four months, (d) a ten month extraction phase at 2,500 gpm recovering 3,314 acre-feet (1.08×10^9 gallons) of water, and (e) two months of post testing; and

19. Based on data collected from the 96-day Phase I ASR demonstration test which consisted of 26 days of injection and three extraction phases totaling 29 days, the City has developed a numerical model to estimate the anticipated injection front and capture zones for ISR cycles; and

20. The particle tracking analysis results from the groundwater modeling suggests that the aquifer storage zone created by the injection of drinking water is expected to travel approximately 550 feet upgradient and 829 feet downgradient from the DCW as shown on Attachment B; and

21. The City's numerical model predicts that approximately 300 percent withdrawal of the volume of the total water injected into the aquifer storage zone will be recovered, ensuring that there is not a threat to water quality at the conclusion of the ISR cycles; and

22. The numerical model suggests that the three existing monitoring wells are adequate to monitor groundwater quality impacts from the Phase II ASR demonstration program; and

23. The water extracted during the recovery cycle will be beneficially used in the City's drinking water distribution system, as approved by DHS; and

24. Water samples will be collected during each cycle to monitor hydrologic conditions, as well as the quality of water injected into the aquifer and changes in groundwater quality; and

25. The monitoring strategy is flexible and is initially intended to identify constituents of concern for continued monitoring activities. Based on the results of initial monitoring, and as appropriate, a reduced sampling schedule and/or list of monitored constituents may be implemented through a revised Monitoring and Reporting Program issued by the Executive Officer without the need to bring it back to the Board, and

Regulatory Considerations

26. The City prepared an Initial Study/Mitigated Negative Declaration for the Diamond Creek Well Phase II Demonstration ASR Project which was adopted at a city council hearing on 3 August 2005; and

27. Injected water quality, including disinfection by-products, is a concern for protection of all beneficial uses when the constituent concentrations exceed water quality objectives for groundwater; and

28. No active or abandoned industrial, agricultural, or domestic wells exist within the aquifer storage zone of the DCW or within an additional 1,000 foot radius; and

29. The City has established institutional controls to ensure that no other users of the aquifer storage zone exist now or in the future. These controls include well permitting requirements as outlined in the City's Well Water Code. The requirements are overseen by the City's Environmental Utilities Engineering Division, which is the same division that is managing the Phase II ASR project; and

30. The water within the aquifer storage zone must meet DHS drinking water standards to be beneficially used in the City's drinking water distribution system; and

31. The Regional Board has a statutory obligation to prescribe waste discharge requirements, but pursuant to Water Code section 13269, may waive waste discharge requirements if it determines, after any necessary meeting, that the waiver is consistent with any applicable state or regional water quality control plan and is in the public interest; and

32. Consistent with Water Code section 13269, any waiver may not exceed five years duration, must be conditional, may be terminated by at any time by the state board or regional board, and must include monitoring, unless waived; and

33. Based on the following considerations, the Regional Board determines that this Waiver is in the public interest:

- a. A serious need exists for communities within the State of California to supplement their water supplies; and
- b. Both the California Bay-Delta Authority and the California Department of Water Resources recommend ASR technology for supplementing water supplies where agencies can conjunctively use both surface water and groundwater supplies; and
- c. The Regional Board has determined that the injection of drinking water for future extraction is not a discharge of waste that warrants issuance of waste discharge requirements due to the limited nature, extent and duration of the above-described discharge, the preclusion of other uses and users, and the fact that all injected water will be recovered. However, an injection of drinking water that exceeds MCLs within the aquifer storage zone or results in an exceedence of water quality objectives outside the aquifer storage zone may be subject to waste discharge requirements that require compliance with the Basin Plan and/or remediation of water quality impacts; and

- d. The groundwater outside the limits of the aquifer storage zone (a) may have other users/uses now or in the future, and (b) must meet all applicable water quality objectives; and
 - e. If in the future the City proposes to conduct a full-scale ASR project, an appropriate filing fee and a RWD must be submitted to the Regional Board. At a minimum, the RWD must provide: (a) a description of the project, including the extent of the portion of the aquifer storage zone that may exceed water quality objectives (a.k.a. the “bubble”), (b) a completed well survey, (c) documentation that institutional controls are in place to ensure that no other users of the bubble exist, (d) a full-scale monitoring program, (e) a sampling and analysis plan, (f) well construction details for all injection/extraction and monitoring wells, (g) a contingency plan detailing measures to be implemented to ensure water quality objectives are met beyond the bubble and that DHS drinking water source requirements are met within the bubble, and (h) an adopted CEQA document; and
 - f. Monitoring of the demonstration study is necessary to obtain technical data sufficient to assess potential long-term water quality impacts and the need for mitigation measures associated with more extensive testing or a full-scale project, including an analysis of whether the City must implement Best Practicable Treatment Control (BPTC) measures to reduce the concentrations of disinfection byproducts or other constituents of concern in the water injected into the groundwater; and
 - g. The City must conduct sufficient monitoring during the demonstration study to assess whether a full-scale ASR project would comply with the Antidegradation Policy and demonstrate that dilution and/or degradation will reduce the concentrations of any constituents of concern to below applicable water quality objectives outside the bubble; and
34. Based on the following considerations, the Regional Board determines that this Waiver is consistent with applicable water quality control plans:
- a. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Board; and
 - b. The designated beneficial uses of the groundwater in the vicinity of the City’s ASR Project are municipal and domestic supply, agricultural supply, industrial service supply, and industrial process supply; and
 - c. The Basin Plan contains several narrative water quality objectives that apply to groundwater in the vicinity of the City’s ASR project; and

- d. The Chemical Constituents objective requires that chemical constituents shall not be present in concentrations that adversely affect beneficial uses and shall not exceed maximum contaminant levels (MCLs) adopted by DHS; and
- e. The Toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses; and
- f. The Tastes and Odors objective requires that groundwater shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses; and
- g. Chapter IV of the Basin Plan contains the *Policy for Application of Water Quality Objectives*, which provides that “[w]here compliance with narrative objectives is required (i.e., where the objectives are applicable to protect specified beneficial uses), the Regional Water Board will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives”; and provides that to evaluate compliance with narrative water quality objectives the Regional Board considers, among other things, “relevant numerical criteria and guidelines developed and/or published by other agencies and organizations”; and
- h. The following are appropriate water quality limits for trihalomethanes, haloacetic acids, and other disinfection byproducts to apply applicable water quality objectives for groundwater:

<u>Constituent</u>	<u>Water Quality Limit, ug/l</u>	<u>Reference</u>
Chlorine residual	2	Odor Threshold
Total THMs	80	US EPA Primary MCL
Chloroform	1.1	Cal/EPA Cancer Potency Factor
Bromoform	4	US EPA IRIS Cancer Risk Level
Bromodichloromethane	0.27	Cal/EPA Cancer Potency Factor
Dibromochloromethane	0.37	Cal/EPA Cancer Potency Factor
Total HAAs	60	US EPA Primary MCL
Dichloroacetic acid	0.7	US EPA IRIS Cancer Risk Level
Trichloroacetic acid	20	US EPA Health Advisory
Chloroacetic acid	30	US EPA Health Advisory
NDMA	0.0022	Cal/EPA Cancer Potency Factor

- i. If at the end of all ISR cycles, constituents of concern remain above applicable water quality objectives or if at any time groundwater exceeds any DHS drinking water standard, then the City will implement its Contingency Plan that was submitted as part of the RWD; and

- j. The City's Contingency Plan states that if any of the water quality samples collected and analyzed at the end of the extraction period identify constituents remaining in the aquifer above their applicable water quality objectives, additional extraction will be performed until the monitoring data confirms that these chemical constituents are at concentrations below their respective water quality objectives; and
- k. State Water Board Resolution 68-16 requires, in part, that the Regional Board in regulating the discharge of waste maintain high quality waters of the state (i.e., background water quality) until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the state, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Board's policies (e.g., quality that exceeds water quality objectives). The project may result in degradation of waters of the state. The Regional Board determines that some degradation of waters of the state as a result of this aquifer storage and recovery project is consistent with State Water Board Resolution No. 68-16 because:
 - 1) The project will result in increase in water supply at times when supply is limited and, therefore, some degradation is consistent with maximum benefit to people of the state;
 - 2) This Waiver requires the Discharger to minimize the degradation of waters of the State by fully implementing, regularly maintaining, and optimally operating Best Practicable Treatment and Control (BPTC) measures, including containing the injected water in a limited area and removing inject water;
 - 3) The degradation is limited in extent and time and is limited to constituents typically encountered in municipal drinking water;
 - 4) The degradation does not result in water quality less than that prescribed in the Basin Plan at the end of the Phase II project; and

35. At its meeting on [date], the Regional Board considered all comments concerning this matter:

THEREFORE BE IT RESOLVED, in accordance with California Water Code section 13269, that the California Regional Water Quality Control Board, Central Valley Region, waives waste discharge requirements for the City of Roseville Phase II Demonstration Aquifer Storage and Recovery Program, subject to the following conditions:

- 1. The discharge of water shall not create a condition of pollution or nuisance (as defined in Section 13050, California Water Code) beyond the aquifer storage zone identified in Attachment B; and

2. Any condition of pollution or nuisance (as defined in Section 13050, California Water Code), including violation of any water quality objective created during injection, storage, and recovery shall not remain in the aquifer at the conclusion of the ISR cycles; and
3. Due to the benefit of the increased water supply by the public entity, some groundwater degradation at the end of the Phase II ASR demonstration program may be allowed only if those concentrations are less than water quality objectives; and
4. Only treated water from the City's WTP shall be injected into the ASR well at an average flow rate not to exceed 1,375 gpm and a total volume for a 6-month period not to exceed 1,094 acre-feet (3.56×10^8 gallons); and
5. During the recovery cycle, the Discharger shall extract a minimum of 300 percent of the volume of water injected during that same cycle as proposed in the RWD; and
6. Prior to implementing the Phase II ASR demonstration program, the Discharger shall obtain from DHS written approval for discharge of extracted water to the drinking water distribution system, and shall submit a copy of that approval to the Regional Board; and
7. The City shall operate and maintain the ASR groundwater monitoring wells, and shall evaluate the potential for groundwater degradation and the need to reduce the levels of THMs, HAAs, other disinfection byproducts, or other constituents of concern in treated source water due to this activity in compliance with the attached Monitoring and Reporting Program (MRP) (Attachment C), which is attached hereto and made part of this Resolution by reference; and
8. Water quality samples shall be collected and analyzed during the testing cycles in accordance with the MRP (Attachment C); and
9. If THMs, HAAs, other disinfection byproducts, or other constituents of concern are detected at levels exceeding applicable water quality objectives (a) beyond the City's anticipated injection front during the testing, or (b) in the aquifer at the conclusion of the recovery phase of testing, then the City shall notify the Regional Board within 24 hours of becoming aware of the detection, and shall immediately implement its Contingency Plan; and
10. The City shall submit the monitoring reports to the Regional Board as described in the MRP, Attachment C; and
11. This Resolution expires within **120 days** following completion of the post-testing phase of the Phase II ASR demonstration project and shall have a term of no longer than five years from the date of adoption.

BE IT FURTHER RESOLVED that this Waiver of waste discharge requirements is conditional and may be terminated at any time.

RESOLUTION NO. R5-2005-0106
WAIVING WASTE DISCHARGE REQUIREMENTS FOR
CITY OF ROSEVILLE
DIAMOND CREEK WELL
PHASE II DEMONSTRATION ASR PROJECT
PLACER COUNTY

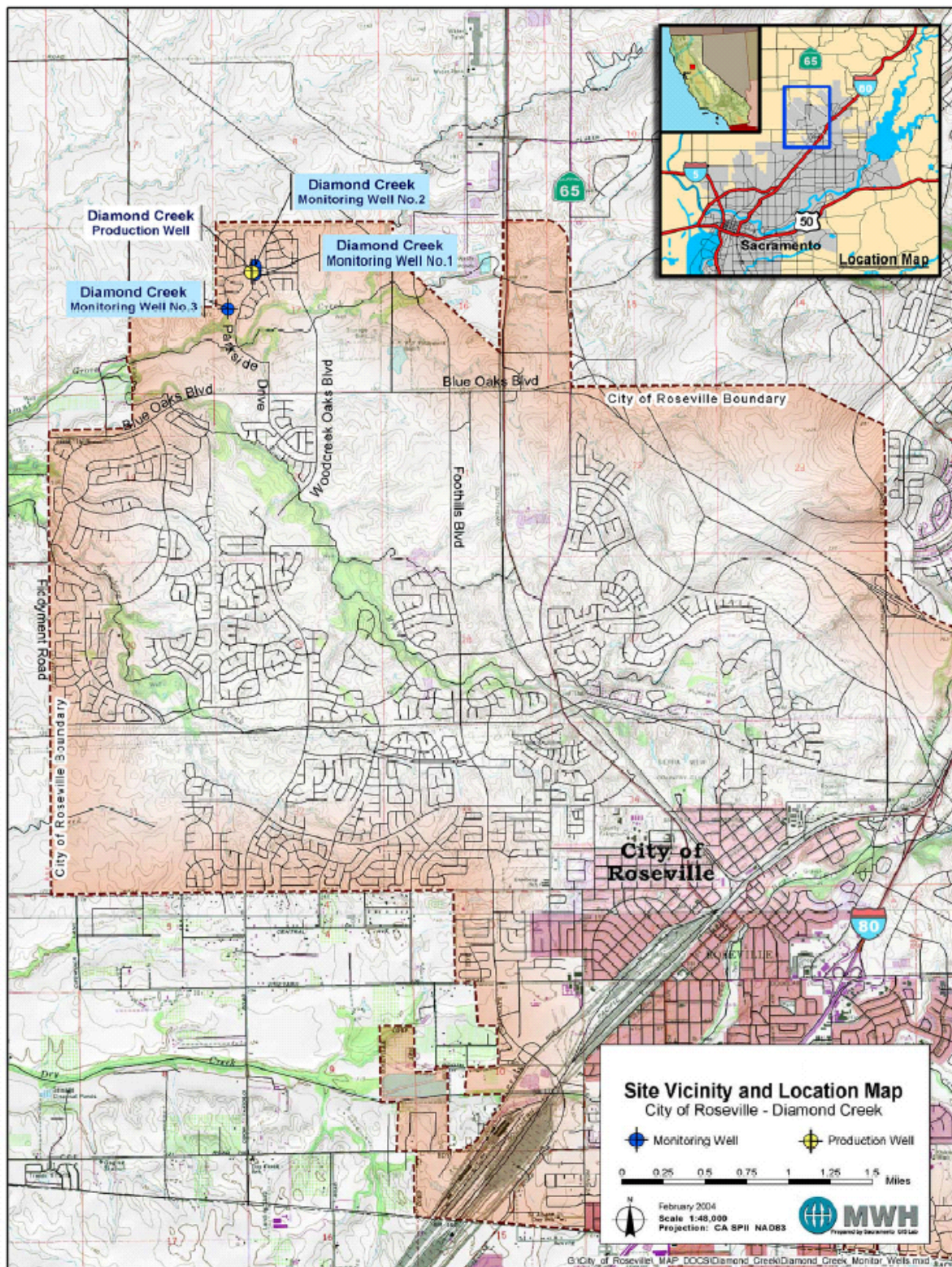
-11-

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a true, full, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 5 August 2005.

THOMAS R. PINKOS, Executive Officer

GJC: 5 Aug 05

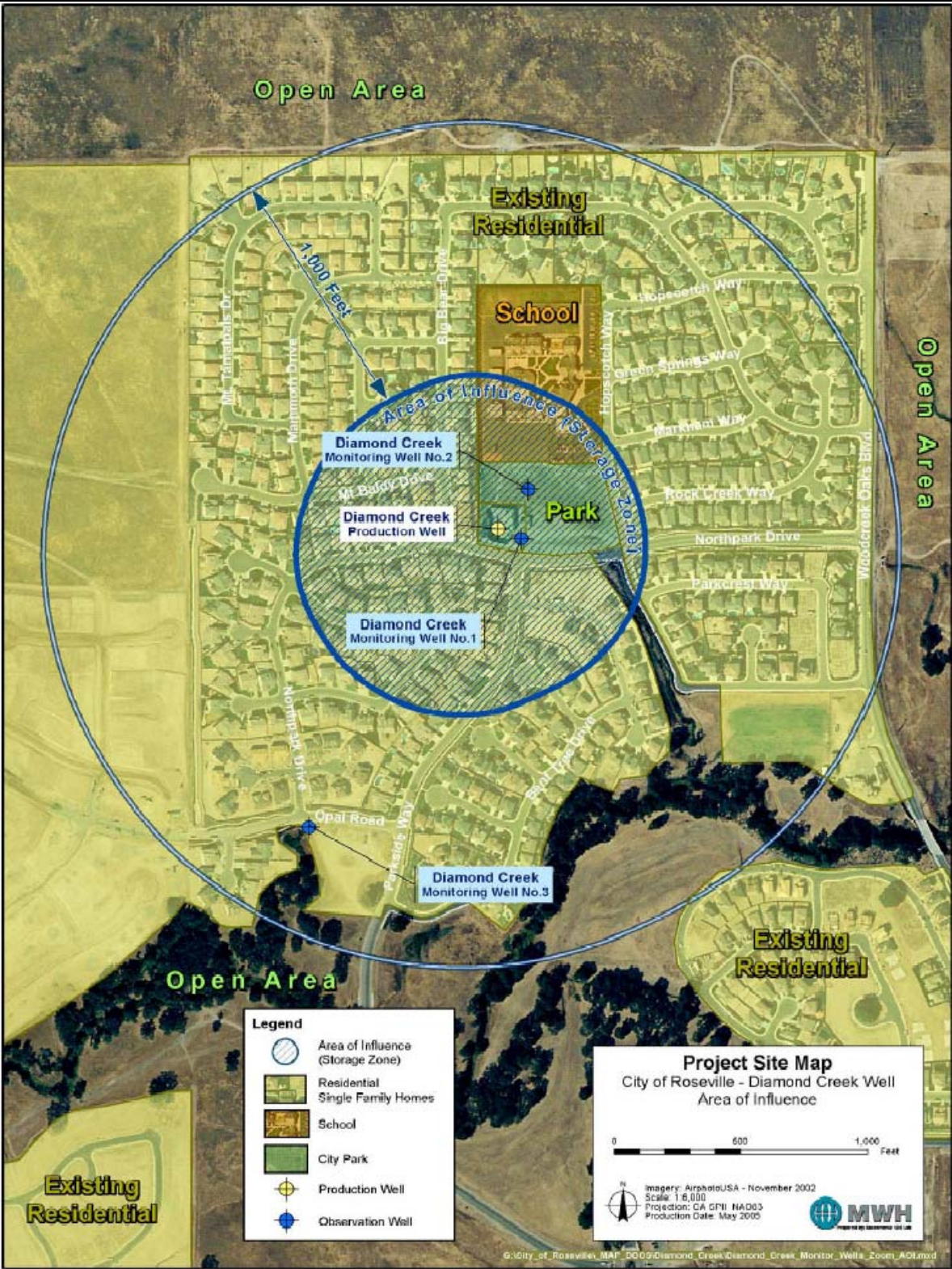
AMENDED

**SITE VICINITY AND LOCATION MAP**

Drawing Reference:

City of Roseville and MWH
 Site Specific Technical
 Memorandum, 15 May 2005

CITY OF ROSEVILLE
 DIAMOND CREEK WELL
 PHASE II DEMONSTRATION ASR PROJECT
 PLACER COUNTY



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Site Specific Technical
Memorandum, 15 May 2005

PROJECT SITE MAP

CITY OF ROSEVILLE
DIAMOND CREEK WELL
PHASE II DEMONSTRATION ASR PROJECT
PLACER COUNTY

ATTACHMENT C
RESOLUTION NO. R5-2005-0106

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM
FOR
CITY OF ROSEVILLE
DIAMOND CREEK WELL
PHASE II DEMONSTRATION AQUIFER STORAGE AND RECOVERY PROJECT
PLACER COUNTY

This monitoring and reporting program (MRP) incorporates requirements for monitoring of treated injection water and groundwater, and is issued in conjunction with Waiver Resolution No. R5-2005-0106. This MRP is issued pursuant to California Water Code Section 13267. All samples shall be representative of the volume and nature of the discharge. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

TREATED INJECTION WATER MONITORING

Injection water from the City of Roseville's Water Treatment Plant (WTP) will be tested immediately prior to injection to establish baseline concentrations, and during the injection cycle. The baseline sampling shall consist of two WTP sampling events. These events shall be at least one week apart. Samples shall be analyzed for the constituents tabulated below. Samples shall be collected from an established sampling station located in an area that will provide representative samples. Injection water monitoring shall include at least the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
PH	std.	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Dissolved Organic Carbon	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Total Kjeldahl Nitrogen	mg/L	Grab	Other ¹¹
Total Dissolved Solids	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Standard Minerals ¹	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Chlorine Residual	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Ammonia	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Boron	mg/L	Grab	Other ¹¹
Fluoride	mg/L	Grab	Other ¹¹
Iron	mg/L	Grab	Other ¹¹
Manganese	mg/L	Grab	Other ¹¹
Molybdenum	mg/L	Grab	Other ¹¹
Anion Scan ² (EPA 300)	mg/L	Grab	Other ¹¹
Trace Metals ³ (EPA 6010B)	mg/L	Grab	Other ¹¹
Antimony (EPA 7062)	mg/L	Grab	Other ¹¹
Arsenic (EPA 7062)	mg/L	Grab	Other ¹¹
Cadmium (EPA 7131A)	mg/L	Grab	Other ¹¹
Lead (EPA 7421)	mg/L	Grab	Other ¹¹
Mercury (EPA 7471A)	mg/L	Grab	Other ¹¹

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Nickel (EPA 7521)	mg/L	Grab	Other ¹¹
Selenium (EPA 7742)	mg/L	Grab	Other ¹¹
Thallium (EPA 7841)	mg/L	Grab	Other ¹¹
Trihalomethanes ⁴ (EPA 8260B)	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Haloacetic Acids ⁴ (EPA 8260B)	mg/L	Grab	Weekly ⁸ , Bi-monthly ⁹ , Monthly ¹⁰ , Other ¹¹
Volatile organics ⁵ (EPA 8260B)	mg/L	Grab	Other ¹¹
Semi-volatile organics ⁵ (EPA 8270C)	mg/L	Grab	Other ¹¹
Organochlorine Pesticides ⁵ (EPA 8141A)	mg/L	Grab	Other ¹¹
N-Nitrosodimethylamine ⁶	µg/L	Grab	Other ¹¹
Total Coliform Organisms ⁷	MPN/10 0 ml	Grab	Other ¹¹

¹ Standard Minerals shall include the following: calcium, magnesium, potassium, sodium, total alkalinity (including alkalinity series), and hardness.

² Anion scan shall include the following: bromide, chloride, nitrate (as N), nitrite (as N), phosphate, sulfate, sulfite.

³ Trace metal scan shall include the following: barium, beryllium, chromium, cobalt, copper, silver, tin, vanadium, zinc.

⁴ Individual trihalomethane and haloacetic acid constituent concentrations shall be monitored and reported.

⁵ All analytical peaks shall be identified and their concentrations reported.

⁶ Using California DHS approved sampling and analysis methods and quantitation limits consistent with DHS Detection Limits for Purposes of Reporting (DLRs).

⁷ Using a minimum of 15 tubes or three dilutions

⁸ Weekly sampling conducted during the first and last weeks of the injection cycle.

⁹ Bi-monthly sampling conducted for the second sample during the injection cycle.

¹⁰ Monthly sampling conducted during the final 5 months of the injection cycle following the weekly sampling.

¹¹ Two additional samples to be collected 1 week prior to the injection cycle to establish baseline conditions.

GROUNDWATER MONITORING

Groundwater monitoring and sampling shall be conducted in accordance with the 10 June 2003 Sampling and Analysis Plan (SAP) and the information provided in the 15 May 2005 RWD, except as specified below.

Prior to initiating the test, baseline sampling from two groundwater sampling events shall be conducted in the Diamond Creek Well and each of the three monitoring wells. These events shall be at least one week apart. Samples shall be analyzed for the constituents and using the methods tabulated below. Groundwater samples shall also be collected from each of the monitoring wells during the entire length of the testing program, and in the Diamond Creek Well during the storage, extraction, and post-extraction cycles. Samples obtained from the Diamond Creek Well shall not be filtered prior to analysis. Groundwater sampling shall include the following constituents:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Depth to Groundwater	0.01 feet	Measurement	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Groundwater Elevation ¹	0.01 feet	Calculated	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Gradient	feet/feet	Calculated	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
pH	Std.	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Dissolved Organic Carbon	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Total Kjeldahl Nitrogen	Mg/L	Grab	Other ¹²
Total Dissolved Solids	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Standard Minerals ²	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Chlorine Residual	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Ammonia	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Boron	Mg/L	Grab	Other ¹²
Fluoride	Mg/L	Grab	Other ¹²
Iron	Mg/L	Grab	Other ¹²
Manganese	Mg/L	Grab	Other ¹²
Molybdenum	Mg/L	Grab	Other ¹²
Anion Scan ³ (EPA 300)	Mg/L	Grab	Other ¹²
Trace Metals ⁴ (EPA 6010B)	Mg/L	Grab	Other ¹²
Antimony (EPA 7062)	Mg/L	Grab	Other ¹²
Arsenic (EPA 7062)	Mg/L	Grab	Other ¹²
Cadmium (EPA 7131A)	Mg/L	Grab	Other ¹²
Lead (EPA 7421)	Mg/L	Grab	Other ¹²
Mercury (EPA 7471A)	Mg/L	Grab	Other ¹²
Nickel (EPA 7521)	Mg/L	Grab	Other ¹²
Selenium (EPA 7742)	Mg/L	Grab	Other ¹²
Thallium (EPA 7841)	Mg/L	Grab	Other ¹²
Trihalomethanes ⁵ (EPA 8260B)	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Haloacetic Acids ⁵ (EPA 8260B)	Mg/L	Grab	Weekly ⁹ , Bi-monthly ¹⁰ , Monthly ¹¹
Volatile organics ⁶ (EPA 8260B)	Mg/L	Grab	Other ¹²
Semi-volatile organics ⁶ (EPA 8270C)	Mg/L	Grab	Other ¹²
Organochlorine Pesticides ⁶ (EPA 8141A)	Mg/L	Grab	Other ¹²
N-Nitrosodimethylamine ⁷	µg/L	Grab	Other ¹²
Total Coliform Organisms ⁸	MPN/100 ml	Grab	Other ¹²

¹ Groundwater elevation shall be determined based on depth-to-water measurements from a surveyed measuring point elevation on the well.

- ² Standard Minerals shall include the following: calcium, magnesium, potassium, sodium, total alkalinity (including alkalinity series), and hardness.
- ³ Anion scan shall include the following: bromide, chloride, nitrate (as N), nitrite (as N), phosphate, sulfate, sulfite.
- ⁴ Trace metal scan shall include the following: barium, beryllium, chromium, cobalt, copper, silver, tin, vanadium, zinc.
- ⁵ Individual trihalomethane and haloacetic acid constituent concentrations shall be monitored and reported.
- ⁶ All analytical peaks shall be identified and their concentrations reported.
- ⁷ Using California DHS approved sampling and analysis methods and quantitation limits consistent with DHS Detection Limits for Purposes of Reporting (DLRs).
- ⁸ Using a minimum of 15 tubes or three dilutions
- ⁹ Weekly sampling conducted during the first and last weeks of the injection cycle, during the first 3 and last weeks of the storage cycle, and during the first 3 weeks of the extraction cycle.
- ¹⁰ Bi-monthly sampling conducted for the second sample and during the last 2 months of the injection cycle, and months 2 through 4 of the storage cycle.
- ¹¹ Monthly sampling conducted during months 2 through 4 of the injection cycle, during months 2 through 11 of the extraction cycle, and for both samples during post-test sampling.
- ¹² Additional samples to be collected 1 week prior to the injection cycle, after 2 months of storage, prior to the extraction cycle, immediately following the end of the extraction cycle, and one month after the end of the extraction cycle.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type, and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with the waiver.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed/stamped by the registered professional.

Monitoring reports shall be submitted to the Regional Board **every 60 days** following initial testing. A reporting schedule shall be submitted to the Regional Board with the first groundwater monitoring report. The monitoring reports shall discuss the water sampling and analytical results associated with the ASR demonstration testing, summarize important findings of the cycle monitoring relevant to the conditions of this waiver, and clearly evaluate and discuss compliance with the conditions of this waiver. Monitoring reports shall include the following information:

1. Locations of injection well, monitoring wells and any other sampling stations;
2. Results of the treated injection water and groundwater monitoring data;
3. Cumulative data tables;
4. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for the treated injection water and groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance with the waiver;
5. Determination of groundwater gradient, area of influence, and impact to groundwater quality for all monitoring events;
6. A comparison of pre-test baseline groundwater monitoring data and applicable water quality limits with data collected following initiation of the testing program to evaluate water quality

during the testing program and compliance with the conditions of this waiver. Data shall be presented in tabular format and compliance with the conditions of Waiver Resolution No. R5-2005-0106 shall be discussed in detail;

7. Copies of laboratory analytical report(s) for injection water and groundwater monitoring; and
8. A calibration log verifying calibration of all hand held monitoring instruments and devices used to comply with the prescribed monitoring program.

A letter transmitting the self-monitoring reports shall accompany each report. Such a letter shall include a discussion of non-compliance and other concerns found during the reporting period, and actions taken or planned for addressing noted concerns, such as operation or facility modifications. If the discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain a statement by the discharger, or the discharger's authorized agent, under penalty of perjury, that to the best of the signer's knowledge the report is true, accurate and complete.

The Discharger shall implement the above monitoring program as of the date of this Order.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

5 August 2005
(Date)